Opening up innovation in buyer-supplier relationships: Empirical evidence of antecedents and its effect on supply chain competence

Abstract:

This paper focuses on coupled processes with key suppliers, which we call supply chain-open innovativeness relationships. Drawing on social exchange theory, we identify some antecedents of this orientation in the relationship an organization can maintain with its key supplier. We measure some of these constructs in terms of gap by comparing perceptions with previous expectations. We also analyze open innovation performance in terms of competence improvement. Both the proposed model and the hypotheses were tested on a sample of 286 firms. The results confirm that trust, commitment, and procedural justice enable the existence of a supply chain-open innovativeness relationship and the effect of this relationship on supply chain competence. We also confirm the positive effect of supply chain competence on firm performance.

Keywords: supply chain management, social exchange theory, open innovation, supplier integration, supply chain competence, firm performance.

1. Introduction

The development of new products and services or the improvement of those an organization already provides constitutes one of the key mechanisms that permit the organization to maintain its competitive advantage. The time between development and launching of products and services is key to this success. Being first, that is, getting ahead of the competition, is the condition sine qua non for achieving a competitive advantage. This condition is imperative, among other factors, because an organization’s customers (with increasingly changing needs) are becoming better informed and the pressure the competition exerts on the organization is increasing (Menon et al., 2002; Tamayo Torres et al., 2014). When facing this reality, organizations must improve the functionality of their innovation process, for example, by initiating new business practices characteristic of open innovation (Chesbrough, 2003).

Open innovation analyzes the exploration and exploitation of knowledge to improve an organization’s performance so as to maintain its competitive advantage over time. Increasingly conscious that talent is found outside their boundaries, companies can use the knowledge in their customers, suppliers, and competitors and in universities, and vice versa. Such practices are inherent in this new paradigm, whose adoption is key to proper management of the organization’s relationships with its stakeholders. These potential sources of innovation have been treated generically in the literature on open innovation, specifically for the case of users, universities, etc. The particular case of the supplier as a source of innovation has hardly been tackled (Enkel et al., 2009; Lichtenhalter, 2011; Thomas, 2013), however, despite its widely recognized importance in the literature that analyzes generally the sources of innovation in an organization operating under open innovation (Von Hippel, 1998; Laursen and Salter, 2006; Un et al., 2010; Mention, 2011; West and Bogers, 2014). Along these lines, the study by Enkel and Gassmann (2008) shows suppliers to be the second source of innovation that organizations use (61%), and Enkel et al (2009) indicate that 69%
of knowledge sources come from suppliers. One must thus take into account that the prior literature and the literature based on this new paradigm (Von Krogh, 2011) indicate that technological development takes place thanks to links maintained, especially with suppliers with whom companies share competences in a close relationship (Tomlinson and Fai, 2013). Given the importance of the supplier as a source of innovation and in response to the scarcity of literature analyzing this topic, our research focuses on the relationships maintained with providers that represent a source of innovation for the organization and vice versa. That is, we study the orientation to open innovation of the relationship these partners maintain and in which there is an intention to achieve mutual benefit in terms of innovative performance. Our study thus joins those by Chiang and Hung (2010) and Sisodiya et al (2013) in believing that organizations must focus their efforts on close relationships with few knowledge sources characterized by strong, frequent contacts that enable knowledge transfer through boundary-spanning activities.

Since the paradigm on which our study is based is in the early stages of development, we need antecedents or elements that facilitate its adoption in an organization. Because open innovation is established in collaborative relationships in which a spirit of information exchange presides, we believe it is useful to apply some elements from social exchange theory, which has been used in the context of the supply chain to identify elements facilitating information exchange and collaboration. Specifically, we propose verifying the extent to which the level of trust, commitment, and procedural justice influence greater or lesser orientation to open innovation in the relationship maintained with the supplier.

If we examine studies based on the positive effects this paradigm has on the performance of the organization that adopts it, we find that some studies indicate possible strengthening of the competences in an organization as a result of their implementation (Gassmann, 2006; Bilgram et al., 2008; Cheng and Chen, 2013). One competence the entire organization possesses is management of the supply chain to which it belongs. This competence is essential, since the supply chain members contribute to the chain’s competitiveness when they strengthen and stimulate this competence. This importance increases if we consider that organizations today depend to a greater extent on the competitiveness of the supply chain of which they form part than on their own. There is thus marked interest at the theoretical and practical levels in understanding how firms can strengthen their competence in supply chain management and the implications of this management for organizational performance. Our research attempts to show the connection between orientation to open innovation in an interorganizational relationship (buyer firm-seller firm) and the strengthening of competence in managing the buying firm’s supply chain.

This study aims to contribute to entrepreneurial literature and practice, given the lack of research on inclusion of the supplier as a source of innovation in the development or improvement of products or services. We seek to fill the gap in the literature that analyzes the conditions facilitating participation in and government of open relationships, as well as the literature on incentives for knowledge transfer (Mucelli and Marinoni, 2011; Gambardella and Panico, 2014). We also seek to address the absence of alternative measures of performance in open innovation, such as strengthening of the organization’s competences (Knudsen and Mortensen, 2011). To achieve this goal, our investigation has three specific objectives. First, it attempts to determine what aspects of interorganizational exchange foster orientation to open innovation in the relationship with the supplier. Second, it analyzes the implications of orientation to open innovation in this
relationship for the organization’s competence in managing the supply chain and, ultimately, the effects of this competence on performance measured in different dimensions.

To fulfill these objectives, the next section reviews the literature on open innovation and supplier integration, social exchange theory, and supply chain competence. The hypotheses are developed based on assumptions drawn from the open innovation and supplier integration literatures and from social exchange theory. Subsequently, we discuss the methodology, including data collection, construct measurement, and steps of analysis using structural equations modeling. The empirical results are then presented, followed by a discussion of findings. Finally, we present the theoretical and managerial implications, research limitations, and directions for future research.

2. Literature review

2.1. Open innovation and supplier integration

Traditionally, organizations have believed that maintaining a competitive advantage over time involves internal development and tough control of the innovations from which this advantage originates (Thomas, 2013). This conception of innovation, termed “closed innovation” in the literature, has been questioned by the proliferation of a series of factors characteristic of our era/the twenty-first century. Some of these factors are the mobility of workers between organizations, the need to shorten the time of new product development, and the presence of increasingly informed and demanding suppliers and customers (Chesbrough, 2003).

As a result, organizations have begun to understand innovation as a process that requires constant contact with the surrounding environment, opting to a greater extent for collaboration with members of the supply chain to which the organization belongs and with other interest groups (Mention, 2011). Firms are increasingly conscious of the need to have permeable boundaries, as is seen in practices such as the acquisition of ideas or innovations developed by others or the commercialization of innovations developed by the organization when they do not constitute sources of competitive advantage for the firm.

These entrepreneurial practices have given rise to a new paradigm derived from the entrepreneurial context and termed open innovation. Open innovation has been defined as “the use of internal and external knowledge by firms to perform their R&D projects and expand markets that make use of them” (Chesbrough, 2006: p.1). The literature advocates a balance between closed and open innovation, providing products and services more rapidly than the competition but protecting intellectual property and reinforcing their firms’ capacities (Enkel et al., 2009).

An essential aspect of this new paradigm in any of its dimensions is the establishment of interorganizational relationships with interest groups such as universities, research centers, suppliers, customers, etc. A study by Felin and Zenger (2014) indicates the need for mechanisms to govern open innovation that permit access to knowledge, such as markets, alliances, and partnerships, contests, or platforms, and user innovation. Caetano and Amaral (2011) recognize the importance of establishing
partnerships under this new paradigm. Depending on the stakeholder with whom the partnership is maintained, their study distinguishes between partnership based on the market and partnership based on science. The members of market-based partnerships are those with special connection to the market, such as suppliers and customers (Du et al., 2014).

Recently, the literature has signaled a change in buyer-supplier relations in the context of new product/service development, since, as Chesbrough explains (Wagner, 2010), suppliers’ proposals may be equal to or better than those that occur internally in the organization. The literature on supply chains has thus begun to analyze how to facilitate learning and knowledge flow within these chains (Azadegan et al., 2008). Under the paradigm of open innovation, the study by Wagner (2012) shows that organizations must open their boundaries to suppliers and collaborate with them in the exchange of knowledge. Similarly, Ozman (2008) demonstrates that one way of ensuring the success of innovations is to improve their relational capacity, taking into account both potential and actual suppliers. (Other studies have shown the importance of relying on current providers to solve problems, e.g., Dyer, 1996; 1997; Petersen et al., 2003; Azadegan, 2011; Azadegan et al., 2008; Wagner, 2012).

This approach stems from the fact that suppliers are the stakeholders who know the organization best, since as customers they depend on it. Specifically, suppliers have detailed knowledge of the organization’s products and processes (Von Hippel, 1998; Bessant, 2003; Petersen et al., 2003), as well as valuable information on end users—that is, on the customers that the organization serves. Suppliers provide information on new ways of proceeding, providing the buying organization with a basis for comparing its practices to others in the entrepreneurial environment, as well as for overcoming its competition by not having to perform all of the functions of its value chain alone (Brem and Tidd, 2012). The literature analyzing supplier integration in the different phases of the innovation process shows how participation in design improves the quality, cost, and delivery time of products and services. Participation in development also contributes to improvement in the quality, cost, application of technology, and launch time, with suppliers providing knowledge of the feasibility of production as well as the market situation (Tan, 2002). In any case, one must take into account that the goal of developing new products and services is to satisfy customers’ needs (Ruiz Moreno et al., 2014) and must affect the supply chain’s capacity to do this, through reliable delivery and efficiency (Tracey and Vonderembse, 2000).

Considering the supplier as a source of innovation is not risk-free, however. Risks include knowledge leaks by the supplier, which also prevent the organization from achieving competitive advantage sustainable over time, since the supplier serves competing organizations that can use the knowledge the supplier possesses and thus need not contribute to innovative performance themselves (Du et al., 2014). In the face of such risks, various studies point to developing a climate of reciprocal trust to overcome them (Huston and Sakkab, 2007; Nagati and Rebolledo, 2013). The study by Tomlinson (2010), for example, includes a vision of interorganizational cooperation halfway to the markets and hierarchies whose success depends on the development of trust, relational hiring, and frequency of interaction.
2.2. Antecedents of orientation to open innovation. Social Exchange Theory

Based on the paradigm of open innovation, the study by Sisodiya et al. (2013) shows the importance of constructing relational capacity to obtain benefits from implementing this new focus in the organization. Vanhaverbeke (2006) also argues that proper management of this relationship can enable the organization to overcome risks involved in opening its boundaries to these partners. The prior literature on supplier integration in the development of new products and services, highlights the importance of orienting the relationship to the long term and ensuring that it has high levels of trust, commitment, and open communication. The literature has not reached consensus, however, about the effects of this relationship on innovative performance. Factors must thus be taken into account that can influence performance, such as trust, commitment, or quality of the collaboration (Walter, 2003; Wagner, 2012; Nagati and Rebolledo, 2013; Sambasivan et al., 2013; Cai et al., 2013). Along these lines, Murat and Baki (2011) show how a total quality management practice, the relationship with suppliers, can affect product and process innovation. Likewise, Walter (2003) argues that the way the relationship with the supplier develops can be key for the supplier's participation, as well as the level of trust and commitment that the supplier feels toward the organization it supplies (Morgan and Hunt, 1994; Walter, 2003; He et al., 2014). An extensive literature argues that collaboration relationships are grounded in certain elements of relational exchange, including a high level of trust, as in the studies by Morgan and Hunt (1994) and Wu et al. (2014). Studies by Ring and Van de Ven (1994), Kumar et al., (1995), and Tomlinson (2010) also refer to trust as an antecedent of cooperative relationships.

These elements identified in the literature as promoters of information exchange, collaboration, and innovation in organizations' relationships maintained over time (Tomlinson and Fai., 2013) are present in social exchange theory. This theory has been used to analyze relationships that occur in the supply chain, justifying them in their continuous achievement of benefits for both parties. Originally, this theory claimed that interaction originated in a cost-benefit analysis of the individuals forming part of the relationship (Wu et al., 2014). The study by Wu et al. (2014) performs a literature review of studies that include this theory in analyzing supply chain relationships and identifies the following four elements: trust, commitment, power, and reciprocity. Following this theoretical framework, our study analyzes the trust, commitment, and procedural justice an organization perceives in the supplier with which it maintains a relationship.

2.3. Supply Chain Management. Supply Chain competence

Supply Chain Management is an "integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high performing business model" (www.csmp.org).

Open innovation has been criticized for not contributing anything new to the literature on supply chain management (Von Hippel, 2010) and has even sparked a debate among researchers on the topic. This debate can be resolved if one attends to the different objects of study defined by each side of the debate. Whereas supply chain management focuses on efficiency and cost reduction in the context of the supply chain (Groen and Linton, 2010), open innovation enables effectiveness of the innovation process (Badawy,
We must also take into account that open innovation has its own processes (Von Krogh, 2011) and is broader in scope (Van De Vrande and Man, 2011).

The literature has shown that, in addition to a series of routine practices, supply chain management includes problems that derive from the chain, and capacity for management of the chain (Ellinger et al., 2012). The study by Simchi-Levi et al (2000) identifies three key factors for supply chain management: strategic, tactical, and operational factors. Swaminathan et al (1998) identify configuration, coordination, and contracts to strengthen the quality of the supply chain and its competitive position. Supply chain management attempts in the short term to increase productivity and reduce inventory and delivery time, whereas the longer time frame seeks to obtain market share, satisfy customers’ needs, and contribute to organizational performance (Tan, 2002).

The idea that the organization’s success depends to a greater extent on the capacity of the supply chain to which it belongs than on its own organizational capacities is gaining wider acceptance (Chow et al., 2008; Green et al., 2014). The competitive position and quality of the supply chain are strengthened by the competence that each organization has to manage the chain. This competence is constructed as practices are adopted and problems solved in managing the supply chain (Chow et al., 2008). It is the result of continuous learning by the organization (Spekman et al., 2002), and it permits the organization to attend to demand under any circumstances, that is, to be more flexible and to meet the changing demands of the market it serves, as well as to achieve excellence in the supply chain in its area of operation (Kuei et al., 2005).

Capacity for supply chain management has been defined by Chow et al (2008) in the following terms: “a portfolio of organizational, managerial, technical and strategic capabilities and skills developed by enterprises over time” (Chow et al., 2008, p. 667). For Fisher et al (2000), it is essential to develop the following capacities: foresight, inventory planning, speed of the supply chain, and precision of data.

The study by Kumar and Nambirajan (2014) analyzes the interrelation between the components of supply chain management and their effect on performance. This study highlights the need to focus attention on the problems that stem from supply chain management and the capacity for this management to improve an organization’s efficiency, due to the mediating role of the supply chain between supply chain management practices and performance. Given the clear importance of more in-depth study of this competence, our research analyzes how to strengthen supply chain management and its effect on various aspects of organizational performance, an issue that will be explained in greater detail in the hypotheses, which are developed in the next section.
3. Development of hypotheses and proposed model

Orientation to open innovation in the relationship maintained with the key supplier can improve the resources and capacities present in an organization, especially those that are strategic in character (Gassmann, 2006; Bilgram et al., 2008; Cheng and Chen, 2013). This study investigates the enablers and effects of the supply chain-open innovativeness relationship. Specifically, our research proposes that the supply chain-open innovativeness relationship influences supply chain competence levels. The hypotheses are developed based on assumptions made in the open innovation and supplier integration literatures and in social exchange theory.

3.1. Trust and open innovation

A firm’s trust in the supplier with which it maintains a relationship can be defined based on the level of honesty and benevolence perceived in the supplier, which translates into behavior by the provider that is respectful of the buying organization’s interests (Kwon and Suh, 2004; Sako and Helper, 1998; Morgan and Hunt, 1994). Trust has been recognized as a promoter of knowledge exchange, the essence of open innovation, in studies by Squire et al (2009), Rebolledo and Nollet (2011) and Nagati and Rebolledo (2013), among others.

This is due to the fact that, if organizations trust in each other, they will be more willing to share ideas and information and to approach the relationship by orienting it to problem solving, since they have reduced the risk inherent in their exchange. Trust will thus promote a climate of transparency and openness facilitating exchange (Dyer and Nobeoka, 2000; Cheung et al., 2010; Tseng, 2014). One of the risks in adopting this paradigm is transmitting key information to the supplier, who will in turn work for one’s competitors. A climate of sufficient trust reduces the attendant risks of open innovation with the supplier, increasing the inclination toward such innovation. In a case study, Bunduchi (2013) identifies the presence of trust among organizations as an explanatory variable for collaboration in new product development.

Under this new paradigm, it is not possible to exert control over the development of innovation, as occurred under the traditional model. The key to adopting open innovation is to establish relationships and develop trust in them. Based on the foregoing, we propose the following hypothesis:

H1. A fit in the level of perceived trust that is greater than or equal to that expected has a positive influence on the orientation to open innovation in the relationship maintained.

3.2. Commitment and open innovation

Commitment to the relationship with the supplier exists when one is believes that the relationship underway is worth maintaining over time, without setting a date for its end, and thus the relationship is expected continue indefinitely (Morgan and Hunt, 1994).

Commitment is an essential factor in the success of any interorganizational relationship (Mohr and
Spekman, 1994), since its presence permits the stability so necessary in a supply chain, which fosters investment in specific assets for the relationship between its members (Fynes and Voss, 2002; Fynes et al., 2005). The presence of commitment facilitates maintaining relationships over time with behavior that supports or favors the interests of the buying organization. In general, we can argue that, the greater the expectation that a relationship will last, the greater the willingness to exchange information between its members, thereby increasing the probability for exchange of new practices and ideas (Yang et al., 2008).

Since interorganizational relationships that operate under the new paradigm of open innovation are essentially collaboration relationships, it makes sense to extend the literature that argues this element as essential for cooperation and collaboration to occur (Mohr and Spekman, 1994; Morgan and Hunt, 1994; Nyaga and Whipple, 2011; Wu et al., 2014). The study by Bidault and Castello (2009), which analyzes alliances oriented to new product development, indicates the fundamental character of trust and commitment as triggers of innovation in these alliances. This study shows that the quality of the relationships maintained in alliances influences the resources that each of the members contributes, making these resources key in fostering the creativity that triggers innovation. Based on the foregoing, we propose verifying the following hypothesis:

**H2.** A fit in the level of perceived commitment that is greater than or equal to that expected initially has a positive influence on the orientation to open innovation in the relationship maintained.

### 3.3. Procedural justice and open innovation

Procedural justice is defined as the perception of equity in the development and administration of policies in the relationship maintained with the supplier (Griffith et al., 2006). The influence of procedural justice both on prolonging the relationship and on the behavior of the parties composing it has been shown.

When a supplier and the firm it supplies perceive that procedural justice is present, there is greater willingness to exchange and transfer knowledge between them, among other reasons, because both have a greater will to cooperate (Wu et al., 2014; Liu et al., 2012). Acting in the interest of the relationship, as well as outside its normal parameters, thus depends on the perception by both parties who maintain the relationship that the treatment received is just (Narasimhan et al., 2013). Acting outside the normal parameters in a relationship between supplier and buyer firms may include exchange of information on the market situation, the competition, other suppliers, end user preferences, etc., ultimately exchange of additional information beyond what normally occurs in the supply context. The motivation for this exchange, as well as the supplier’s support to the firm it supplies in the innovation process, lies not only in the potential economic benefit to the parties but also in the perception of fair treatment received (Franke et al., 2013).

As a result, the presence of procedural justice grants relational value that supports the innovation activities the supplier can perform (Luo, 2007) and thus becomes essential to enabling the relationship that the supplier and the firm maintain to be oriented to open innovation. The presence of procedural justice has thus been associated with the promotion of change and the development of innovative products and services (Lee and Sukoco, 2011). The perception of procedural justice promotes the exchange of ideas with the provider in conceiving and executing the development of new products and services (Tjosvold et al., 2010).
Further, it fosters effectiveness of processes, among them innovation (Luo, 2008), providing indirect control of these processes by the weaker party in the relationship (Ireland and Webb, 2007). The prior literature shows that the presence of procedural justice motivates cooperation and its performance, the flow of information and knowledge between organizations. As we have argued, open innovation is based on relationships of cooperation and collaboration grounded in knowledge transfer. Based on the foregoing, we propose verifying the following hypothesis:

**H3.** Procedural justice has a positive influence on the orientation to open innovation in the relationship maintained with the supplier.

### 3.4. Open innovation and supply chain competence.

Competence in an organization’s supply chain management permits improvement of quality and excellence in supply chain operations, constituting a source of competitive advantage for the organization that possesses it.

The literature indicates that more effective use and strengthening of the organization’s own resources and capacities, especially those that are strategic in character, is one benefit of adopting open innovation (Gassmann, 2006; Bilgram et al., 2008; Cheng and Chen, 2013). Further, Erzurumlu (2010) argues that it is possible to obtain advantages from open innovation at the operating level, which can be considered a strategic asset practiced between members of a supply chain. To this, one must add that the supplier is the stakeholder who best knows the buying organization’s products, services, and processes (Bessant, 2003; Petersen et al., 2003). Further, the supplier is the only stakeholder with valuable, easily understood information about the end customers, information that the organization can access if the relationship with the supplier is oriented to open innovation, since practice of open innovation involves extensive knowledge exchange (Mucelli and Marinoni, 2011). Along these lines, Liu et al (2012) argue that knowledge exchange helps organizations to understand their products and processes, and the competition they face, as well as markets, enabling improvement of their problem-solving capacity and their foresight and coordination of production and delivery activities, activities related to inventory, etc. (Kotabe et al., 2003; Paulraj et al., 2008; Wu et al., 2014). The information accessed within a relationship of collaboration or cooperation is thus considered a resource that provides competitive advantage and is associated with improvement of operating performance (Nagati and Rebolledo, 2013).

Since open innovation is established in collaboration relationships, we must take into account a series of studies that argue that collaborative links between organizations permit shared learning, knowledge transfer, exchange of technical information between the supplier and the buying organization, and development of new capacities and strengthening of existing ones that influence innovative performance (Molina et al., 2007; Tomlinson and Fai, 2013). Cook et al (2011) join arguments in the literature that show how the capacities of supply chain members improve as the level of interaction increases. A successful collaboration relationship involves exchange of ideas and experiences that permits the collaborating organizations to obtain a more complete vision when facing their everyday situation and the problems that threaten them, as well as a greater variety of solutions to these problems and thus better performance in
reducing their errors (Zacharia et al., 2011). Grant (1996) shows that integrating knowledge derived from
links in the supply chain in production and delivery decisions leads to better operating performance. Further,
it has been confirmed that interorganizational collaboration and innovation provide the customer with better
delivery service, among other benefits (McGinnis and Vallopra, 1999a; 1999b; Narasimhan and Das, 1999;
Tracey and Vonderembse, 2000), since the supplier acquires deeper knowledge of how the buying
organization functions, enabling better coordination of supply chain activities that permits the organization to
satisfy the expectations of the end users. The opposite, that is, lack of coordination between supplier and
customer, brings poor performance in inventory and service, as well as erroneous predictions (Lee et al.,
1997). Based on the foregoing, we propose validation of the following hypothesis:

**H4**: Orientation to open innovation between supplier and firm has a positive effect on the capacity to manage
the firm’s supply chain.

3.5. **Supply chain competence and performance.**

Competence in supply chain management is key to maintaining a competitive advantage over time,
in determining the distribution, quality, and service delivered to the customer—ultimately, in achieving
excellence in supply chain operations. This competence derives from experience and continuous learning in
the organization (Spekman et al., 2002), which guarantee its flexibility by enabling attention to customers’
needs in form, place, and quantity and at the moment (Chow et al., 2008).

the positive impact of these capacities on performance. Further, research confirms that improving the service
provided to the customer has a positive influence on organizational performance (Liao and Kuo, 2014). An
organization improves its performance through capacities that are a source of competitive advantage and
that, as a result, contribute to improving performance (Tamayo Torres et al., 2011; Tjosvold et al., 2010).

Thus, excellence in supply chain management permits customer satisfaction and the achievement of
competitive advantage if one performs better than the competition in this respect (Flint et al., 2008),
permitting improvement in organizational performance (D’Avanzo et al., 2003). Excellence also permits
better financial performance, since greater liquidity is obtained by reducing inventory, and prices can
increase when the service provided improves (Johnson and Templar, 2011). Thus, D’Avanzo et al (2004)
argue that leadership in supply chain management leads to financial leadership. As a result, we propose
validating the following hypothesis:

**H5**: An organization’s capacity for supply chain management positively influences its performance.

The joint consideration of these hypotheses produces the structural model in Figure 1. This figure
shows how the fit between expectations and actual perceptions of trust and commitment and the level of
procedural justice from key suppliers enable a relationship of supply chain-open innovativeness. The open
innovation orientation of the relationship strengthens the organization’s supply chain competence, which will
affect the firm’s performance positively.
4. Research design

4.1. Sample design

To test the different hypotheses, we performed an empirical study of manufacturing and service firms. The SABI databases were used to obtain the study population. The questionnaire, specially designed for this study, examines primarily the antecedents of the supply chain-open innovativeness relationship and its effects on supply chain competence. Because qualified firms require considerable experience in SCM practice, we assume that larger firms will be more likely to have these experiences. A sample of 2000 firms (1400 manufacturing firms and 600 service firms) was chosen at random. In all cases considered valid, the informants were logistics/purchasing executives. These managers are more likely to establish close relationships with suppliers specifically oriented to open innovation and its impact on supply chain competence. A CATI (computer-assisted telephone interviewing) survey method was used for the study. The responses were collected from June-October 2013.

4.2. Sample demographics

Initially, a pretest was used to determine the scale. The scale was carefully examined by selected practitioners and academicians in this area for translation, wording, structure, and content. The scale’s content validity should be acceptable. 286 valid responses were collected, giving a response rate of 14.3%. Table 1 depicts the sample demographics. Possible bias due to non-respondent firms was analyzed. Considering the late group of respondents as those most likely to be similar to non-respondents, we compared the early and the late groups of respondents to obtain information on non-response bias in the sample (Armstrong and Overton, 1977; Subramani, 2004). Early and late sub-samples were identified as 176 and 110 respondents, respectively. The results of comparing the two groups indicate no systematic non-response bias in the survey data.
Table 1. Demographic.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percent</th>
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<tr>
<td><strong>Industry type</strong></td>
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<tr>
<td>High-tech Manufacturing</td>
<td>96</td>
<td>34.78</td>
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<tr>
<td>Traditional Manufacturing</td>
<td>109</td>
<td>39.49</td>
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<tr>
<td>Services</td>
<td>81</td>
<td>29.33</td>
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<tr>
<td><strong>Annual revenue</strong></td>
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<tr>
<td>&lt;1000M</td>
<td>0</td>
<td>0</td>
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<td>1000-10,000M</td>
<td>88</td>
<td>31.88</td>
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<tr>
<td>10,000-100,000M</td>
<td>168</td>
<td>60.87</td>
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<tr>
<td>&gt;100,000M</td>
<td>30</td>
<td>10.85</td>
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<tr>
<td><strong>Number of employees</strong></td>
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<tr>
<td>50-250</td>
<td>217</td>
<td>78.62</td>
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<tr>
<td>&gt;250</td>
<td>50</td>
<td>18.13</td>
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<tr>
<td><strong>Number of suppliers</strong></td>
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<tr>
<td>&lt;100</td>
<td>240</td>
<td>86.95</td>
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<tr>
<td>100-300</td>
<td>38</td>
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<tr>
<td>&gt;300</td>
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<tr>
<td><strong>Work experience</strong></td>
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<td>10-20</td>
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<tr>
<td>&gt;20</td>
<td>121</td>
<td>43.84</td>
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4.3. Measurement model

4.3.1. Trust and commitment

We measured trust and commitment using a 7-point Likert scale (1=Much worse than expected; 7=Much better than expected) to evaluate the level perceived relative to each question asked about the respondent’s prior expectations. Introducing this response scale is one of the contributions of our research, since no study to date has integrated measurement of expectations and perceptions in a single measurement scale. We can thus measure the relationship between these two aspects over time, something requested in the previous literature.

Following Andersen et al (2009), we believe that expectations about the relationships firms maintain with their key suppliers form at the beginning of the relationship and are conceived as "a belief held by someone of what is most likely to happen in a specific future event" (Andersen et al., 2009, p. 816). We understand key supplier to mean the supplier to which the organization attributes strategic character (Ivens et al., 2009).

The measurement items for trust were adapted from the instrument developed by Kwon and Suh (2004) and Kumar et al (1995), including six items. This construct was measured by the level of honesty and benevolence, that is, based on the degree to which the partner with which an organization relates has the organization’s well-being in mind, a definition largely accepted in the literature (Doney and Cannon, 1997). We analyzed the scale’s internal consistency and reliability. Factor analysis showed that the items loaded on
a single factor, providing proof of one-dimensionality. The Cronbach’s alpha value for internal consistency was 0.893, indicating an acceptable level of internal consistency.

To measure commitment, we adapted the scale developed by Morgan and Hunt (1994), which contains three items to indicate the importance of the relationship for the buying organization, as well as the effort that this organization is willing to make to maintain the relationship. This scale has been used extensively in studies in the area of operations (Fynes and Voss, 2002; Fynes et al., 2005; Zhao et al., 2011; and Wu et al., 2014). Internal consistency (0.826) was analyzed, as was one-dimensionality, using an exploratory factor study.

4.3.2. Procedural justice

A 7-point Likert-type scale (1 = “totally disagree” to 7 = “totally agree”) was developed to measure the perception of procedural justice through three items validated in the study by Griffith et al (2006). These items permit us to evaluate the procedural equity of our suppliers (fairness in treatment and policies) in the relationships maintained with their partners, including our organization. Analysis of the scale’s internal consistency and reliability through factor analysis showed that the items loaded on a single factor, which provides proof of one-dimensionality. The Cronbach’s alpha value for internal consistency was 0.822, indicating an acceptable level of internal consistency.

4.3.3. The Supply Chain-Open Innovativeness Relationship

This section measures the extent to which firms promote an open innovativeness relationship within their supply chain. Our study conceives the relationship oriented to open innovation as one in which the members in the relationship promote the generation of ideas and innovation by others and in which clear goals and objectives for innovation are established jointly and perfected based on the results obtained. Likewise, the members of a supply chain that maintain relationships oriented to open innovation use innovation as an instrument in capturing the talent of other members with which they wish to interact, and conceive innovation beyond technological changes, where innovation shows new ways of satisfying the customer, as well as new ways of working that take maximum advantage of resources, competition, and alliances. Measurement items were adapted from the instrument developed by EFQM (2013), including seven items. The Cronbach’s alpha is 0.936, indicating the scale’s reliability. To ensure one-dimensionality, we checked that all items loaded on a single factor. We constructed our own scale to measure the degree of openness in the open innovation relationship with a single external agent because no such scale exists in the literature. In fact, the recent study by Du et al (2014) justifies the absence of consensus in the literature on the effect of open innovation on entrepreneurial performance in that it does not consider the distinct degree of open innovation present in the organizations that adopt this new paradigm. At the level of the firm, therefore, the degree of innovation is measured with a dummy variable (1=cooperates with the provider; 0=does not cooperate with the provider).
4.3.4. Supply Chain Competence.

The measurement items for supply chain competence were adapted from the instrument developed by Chow et al (2008), containing eight items. Supply chain competence was measured as a variable composed of quality and service issues and operations and distribution issues. A 7-point Likert-type scale (1 = “totally disagree” to 7 = “totally agree”) was developed. The Cronbach’s alpha is 0.905, indicating the scale’s reliability.

4.3.5. Firm performance

We use different measures to evaluate firm performance. The scale was adapted from the instrument developed by EFQM (2013) as a multidimensional construct composed of the following dimensions: customer results, people results, society results and business results. All dimensions include three items except business results, which includes two items. After the scale had been adapted, the purchasing managers were asked what they valued in the past three years, according to a 7-point Likert-type scale (1 = “has increased considerably” to 7 = “has decreased considerably”). The Cronbach’s alpha values are 0.85, 0.892, 0.792, and 0.868 respectively, indicating the scale’s reliability.

4.4. Validity and reliability of scales

After analyzing one-dimensionality and internal consistency of the scales taken individually, we performed a confirmatory factor analysis using the EQS 6.0. software package. The estimation method chosen was Robust ML, once non-normality was confirmed (Bentler, 1995).

The factor loadings are shown in Table 2. All are highly significant and exceed the normally accepted level of 0.4 (Nunnally, 1978). Internal consistency had been studied previously, using the Cronbach’s alpha indicator. Fornell and Larcker (1981) state, however, that composite reliability is a more appropriate indicator, since it is calculated by taking the scale into account in the context of the measurement model. The minimum recommended value is 0.7. This analysis was completed by calculating the average variance extracted, whose minimum recommended value is 0.5. Table 2 shows the scales in all cases to be within the accepted limits, indicating that the measurement model is good.

We also studied all indicators of the measurement scale’s goodness of fit by analyzing the absolute and incremental goodness of fit and the model's parsimony. In all cases, the indicators are within the levels recommended as acceptable in the literature (Hair et al., 1998). We then studied the discriminant validity of the different scales using the square root of the AVE for each construct larger than its correlations with all other constructs (Fornell and Larcker, 1981). Table 3 shows the descriptive statistics and the correlations between the constructs.
Table 2
Convergent validity.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Item</th>
<th>Composite loadings</th>
<th>AVE</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>6</td>
<td>.73-.78</td>
<td>.89</td>
<td>.57</td>
<td>0.893</td>
</tr>
<tr>
<td>Commitment</td>
<td>3</td>
<td>.71-.93</td>
<td>.88</td>
<td>.71</td>
<td>0.826</td>
</tr>
<tr>
<td>Procedural justice</td>
<td>3</td>
<td>.72-.92</td>
<td>.83</td>
<td>.63</td>
<td>0.822</td>
</tr>
<tr>
<td>SCOIR</td>
<td>7</td>
<td>.74-.87</td>
<td>.94</td>
<td>.68</td>
<td>0.936</td>
</tr>
<tr>
<td>SC</td>
<td>8</td>
<td>.70-.83</td>
<td>.91</td>
<td>.57</td>
<td>0.905</td>
</tr>
<tr>
<td>Competence</td>
<td>3</td>
<td>.71-.92</td>
<td>.86</td>
<td>.67</td>
<td>0.85</td>
</tr>
<tr>
<td>Customer results</td>
<td>3</td>
<td>.82-.93</td>
<td>.90</td>
<td>.73</td>
<td>0.892</td>
</tr>
<tr>
<td>Society results</td>
<td>3</td>
<td>.73-.79</td>
<td>.80</td>
<td>.57</td>
<td>0.792</td>
</tr>
<tr>
<td>Business results</td>
<td>2</td>
<td>.83-.92</td>
<td>.87</td>
<td>.76</td>
<td>0.868</td>
</tr>
</tbody>
</table>

Table 3
Discriminant validity

<table>
<thead>
<tr>
<th>Construct</th>
<th>TR</th>
<th>CO</th>
<th>PJ</th>
<th>SCOIR</th>
<th>SC C</th>
<th>CU R</th>
<th>PE R</th>
<th>SOR</th>
<th>BR</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR</td>
<td>.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>.634</td>
<td>.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PJ</td>
<td>.468</td>
<td>.385</td>
<td>.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCOIR</td>
<td>.406</td>
<td>.381</td>
<td>.309</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC C</td>
<td>.553</td>
<td>.343</td>
<td>.428</td>
<td>.353</td>
<td>.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU R</td>
<td>.338</td>
<td>.257</td>
<td>.229</td>
<td>.432</td>
<td>.555</td>
<td>.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE R</td>
<td>.418</td>
<td>.337</td>
<td>.341</td>
<td>.423</td>
<td>.555</td>
<td>.502</td>
<td>.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO R</td>
<td>.379</td>
<td>.245</td>
<td>.316</td>
<td>.178</td>
<td>.614</td>
<td>.470</td>
<td>.614</td>
<td>.76</td>
<td></td>
</tr>
<tr>
<td>BR</td>
<td>.154</td>
<td>.110</td>
<td>.139</td>
<td>.012</td>
<td>.131</td>
<td>.257</td>
<td>.336</td>
<td>.199</td>
<td>.87</td>
</tr>
</tbody>
</table>

TR=T=Trust; CO=Commitment; PJ=Procedural Justice; SCOIR=Supply Chain-Open Innovativeness Relationship; SC C=Supply Chain Competence; CU R=Customer Results; PE R=People Results; SO R=Society Results; BR=Business Results.

5. Results

EQS 6.0 was used to analyze the structural model. The evaluation was performed in three steps according to Chin (1998). First, we estimated the path coefficients and statistical significance for the influential paths. Next, we computed the determination coefficient for the endogenous variables to assess their predictive power. Finally, we examined the relative importance of the first-order indicators for the second-order constructs in terms of indicator weights (Chin, 1998).

The results of the structural analysis are shown in Fig. 2. First, the model’s goodness-of-fit must be studied. In all cases, we have taken into account the indicators and the recommended values presented in Hair et al. (1998). We thus examined three types of indicators of the model’s goodness of fit: absolute, incremental, and parsimonious fit measurements. First, with regard to the model’s absolute fit, the indicators that can be applied to non-competitive analysis strategies are the goodness-of-fit index (GFI) and the root-mean-square error of approximation (RMSEA). The GFI indicator is restricted to the interval of values [0,1].
High values indicate better fit, but no threshold of acceptability has been established. In our case, this indicator took a value of 0.862. The RMSEA is an indicator based on the error of approximation per expected degree of freedom in the population. The lower the indicator, the better the fit, and fit is acceptable for values below 0.08 or even 0.10. In our model, the indicator takes a value of 0.03 and, with the GFI, indicates the model’s good overall fit.

It is also necessary to ensure that the model has good incremental fit. Our analysis focuses on checking the increase in the fit between a base model (normally the null model) and the proposed model. In all cases, values above 0.90 are considered acceptable. In the model proposed, all the indicators were well above the minimum threshold (AGFI= 0.834; NFI= 0.87; NNFI= 0.96; CFI=0.97; IFI=0.97). The final aspect to be studied is the proposed model’s parsimony. Of the measurements proposed, only the normed chi-square is of use in the confirmatory analysis. This measurement must take values above 1 and below 3 or even 5 to ensure that the data are not overfitted (Hair et al., 1998) and to be truly representative of the data. In our case, the value reached is 1.82, within the accepted limits. The results of the analysis are consistent with the hypotheses advanced, confirming the hypotheses proposed. All relationships are significant.

We find that trust, commitment, and procedural justice are reported as important antecedents. Their path coefficients are 0.274 with p<0.001, 0.159, and 0.127 respectively, with p<0.01. Hypotheses 1, 2, and 3 are thus accepted. They jointly explain 17% of the variance in the supply chain-open innovativeness relationship. The supply chain-open innovativeness relationship had a significant impact on supply chain competence with a path coefficient of 0.358 with p<0.001. Hypothesis 4 is thus accepted, explaining 13% of the variance in supply chain competence. Supply chain competence is very important in determining firm performance with a path coefficient of 0.753 with p<0.001. Hypothesis 5 is thus accepted, as it explains 56.8% of the variance in firm performance. We presented the relative importance of the indicators in shaping the latent variables. Further, all of these indicators are significant in composing firm performance.

**Figure 2**
Structural equation estimation. Structural equation
6. Discussion

The current situation, marked by a world economic crisis, shows the need for organizations to focus on the issues that grant them competitive advantage, such as innovation and the position they hold in the supply chain to which they belong.

The literature shows that firms are increasingly aware that their competitive advantage does not rest only with them. Advantage may also be linked to the resources and capacities of their stakeholders, among them members of the supply chain. An organization that wishes to possess an advantage over its competitors must thus open its boundaries, considering the possibility of developing innovations more rapidly, using knowledge from other organizations such as suppliers, or acquiring their innovations, as well as making profitable innovations that it has developed that are not strategic in character. Ultimately, entrepreneurial excellence involves a more open conception of orientation to innovation that permits access to new markets and development or improvement of products and services in less time and with less risk. On the other hand, the capacity of the very supply chain of which the organization forms part is a more powerful source of competitive advantage than advantage within the organization, and the organization must contribute to this external advantage by improving its competence in managing the chain.

The main conclusion to emerge from our study is that competence in supply chain management becomes stronger to the extent that the relationship maintained with the key supplier is oriented toward open innovation; that is, one of the benefits of open innovation is to strengthen an existing capacity operating in the organization. Prior studies in this area, such as those by Gassmann (2006), Bilgram et al (2008), Erzurumlu (2010), and Cheng and Chen (2013), have argued this conclusion at the theoretical level.

Identification of two possible sources of competitive advantage for an organization, the orientation to open innovation in the relationships maintained with stakeholders such as key suppliers and the need to improve competence in supply chain management, led us to propose identifying the aspects that contribute to this competence. Hypothesis 4 thus proposed the effect of orientation to open innovation in the relationship with the key supplier on improved competence in supply chain management of the buying organization. As expected, the results support the hypothesis proposed.

Hypothesis 5 proposed the effect of supply chain management on improvement in organizational performance measured globally as a second-order construct. This hypothesis derives from the need to confirm the direct effect of this competence on performance in its different aspects, as well as on customer satisfaction, which has already been demonstrated. This relationship derives from the theory of resources and capacities, which argues that an organization in possession of a competence that leads to a competitive advantage can obtain better performance (Hult et al., 2003).

This result is explained by the fact that having a higher competence available—in our case, in matters of supply chain management—enables the organization to excel in operations such as preparation and filling of orders, management of inventories, prediction of demand, etc. This competence is thus a source of competitive advantage and leads to better performance in the organization that possesses it. The
development of abilities in matters of quality and service at the operating level, such as responding to the customer on time and fulfilling the delivery date while providing quality products and services that answer to customers’ needs, improves the satisfaction perceived by the customer (Flint et al., 2008) and thus contributes to improved performance for the customer.

An organization that pursues excellence on the operating level and opens itself to the outside in matters of innovation will foster improvement in workers’ performance, as it is not possible to exploit external resources and capacities properly without strengthening internal ones. Finally, improvement in management of inventory and prediction of sales, among other issues, contributes to improvement of financial performance, since it involves a reduction in costs (D’Avanzo et al., 2004; Johnson and Templar, 2011).

Hypotheses 1, 2, and 3 proposed the elements that influence the orientation to open innovation maintained with the key supplier. These elements come from social exchange theory, which has been used to analyze the development of relationships within the framework of a supply chain (Kwon and Suh, 2005; Wei et al., 2012; Wu et al., 2014).

These variables are all significant in determining the relationship between the supply chain and open innovation. Among the SET-based antecedents in particular, meeting or exceeding the expectations of trust has a stronger influence on the supply chain-open innovativeness relationship than does commitment. This may be the case because trust is an antecedent of commitment (Kwon and Suh, 2004), such that the level of trust determines the long-term orientation of the relationship. According to Wu et al (2014), commitment and other issues of social exchange, such as procedural justice, are possible because a high level of trust is present.

Trust has a significant effect on the supply chain-open innovativeness relationship. Therefore, Hypothesis 1 is accepted. A firm that trusts another is aware that knowledge leaks occur, but precisely because this relational element exists, each hopes that the other party will not use leaks against it, a relation that leads to joint learning (Larsson et al., 1998) and an increase in the veracity of the knowledge transmitted (McEvily et al., 2003; Squire et al., 2009). This element becomes key for achieving joint action and fulfilling objectives (Sambasivan et al., 2011). It is thus worth arguing generally that, when the members of a supply chains relate among themselves, they can promote the generation in ideas of the other members of the chain in order subsequently to adopt these ideas, or vice versa, contributing to innovation by other members of the supply chain. Further, in such a context, they can take advantage of these relationships to commercialize innovations that are not useful for them or to access new markets.

Commitment also has a significant but less powerful effect on the supply chain-open innovativeness relationship, enabling us to accept Hypothesis 2. This result agrees with the study by Fawcett et al (2012), which shows how greater capacity for relational commitment translates into greater exchange of all types of information between the parties, even strategic information such as information on new markets or the development of technologies. Some studies thus recognize that the process by which knowledge is shared with the supplier strengthened by the presence of commitment to close social ties constitutes a fundamental source of benefit for the organization (Mucelli and Marinoni, 2011; Nagati and Rebolledo, 2013).
As to procedural justice, we accept Hypothesis 3, due to its positive and significant effect on the supply chain-open innovativeness relationship. Luo (2008) also shows the importance of this element for sharing information and increasing interorganizational cooperation by reducing the possibility of opportunism. Further, it is related as a promoter of cooperative behavior and social harmony at the inter- and intra-organizational levels (Kim and Mauborgne, 1991; 1993; Korsgaard et al., 1995; Sapienza and Korsgaard, 1996).

7. Conclusions and suggestions

In this study, we find that trust, commitment, and procedural justice influence the orientation to open innovation in the relationship an organization maintains with its key supplier. We have also analyzed the effect at the operating level of orientation to open innovation in the relationship a manufacturing or service firm maintains with its main supplier. We show how innovating openly with the supplier leads to improved competence in supply chain management on the part of the buying organization. Finally, we show empirically the positive effect of capacity for supply chain management on performance, measured multidimensionally.

7.1. Implications for theory

We have confirmed empirically the influence on open innovation of some elements that the literature has argued on the theoretical level. These elements are key aspects for good management of relationships oriented to open innovation with other stakeholders. This study contributes to the literature analyzing these success factors in an interorganizational relationship by evaluating trust and commitment differently than they have traditionally been measured by researchers. We measured the level of trust and commitment toward the key supplier with which the relationship is maintained in terms of fit, since these two constructs evolve as the relationship develops. We believe that comparing expectations and perceptions in a single construct provides a broader vision of how the relationship developed over time, to a certain extent overcoming the limitation of cross-sectional studies. We believe that this procedure constitutes an alternative measurement method to be incorporated in future research. The measurement in terms of gap in the constructs indicated constitutes a significant contribution at the theoretical level.

We have also performed more in-depth study of one of the possible sources of competence in supply chain management, an area that studies like that by Kristal et al (2010) argue needs fuller development. The literature on open innovation has pointed to its possible effects on the improvement of capacities existing in the organization or on the promotion of new capacities in general. Our study contributes to the development of the literature on this new paradigm by demonstrating empirically the effect of open innovation on a specific operating capacity in the organization, competence in supply chain management.

We have measured performance as a second-order construct, and this measurement constitutes a contribution on the theoretical level. Studies usually measure performance by differentiating at most between financial and nonfinancial performance, whereas we analyze in greater depth the different dimensions of nonfinancial performance. We believe that this way of measuring performance can represent a valuable tool for use in future studies.
7.2. Implications for practice

This study contributes to entrepreneurial practice in clarifying which aspects help an organization to adopt open innovation with the supplier with whom it maintains a relationship. Managers should not scrimp in their efforts to foster a high-quality relationship based on trust and commitment that meets or exceeds previous expectations. If the trust organizations feel toward their key supplier is not violated, it will be equal to or greater than that expected at the start, reducing the fear of opportunistic behavior from the other party with whom they relate. Likewise, if the commitment maintained has not waned over time—or if it has grown even stronger, also influenced by a good level of trust—the organization will be willing to adopt unconventional practices, including those in the framework of open innovation. In addition, good treatment on the part of the supplier—that is, the presence of procedural justice in the relationship maintained—also encourages willingness to collaborate and exchange information and knowledge, which constitutes the basis of this new paradigm. This study is thus useful for organizations, insofar as it shows that the presence of trust, commitment, and procedural justice in relationship maintained with their key supplier helps organizations to orient themselves to open innovation.

Purchasing managers must recognize the necessity of choosing suppliers based on the capacity and resources that the suppliers have to innovate. This selection criterion, together with a good climate in the relations maintained in the course of the relationship, will benefit the buying organization if it orients its relationship with the supplier toward open innovation, not only in the form of new products, services, or processes, but also in its competence in managing the supply chain, by achieving better coordination with the supplier. Thus, managers must take into account that implementing open innovation in their organization translates not only into improvement in their innovative performance but also into strengthening the contribution that each company makes to the supply chain to which it belongs.

Further, this study shows how improving the capacity of supply chain management strengthened by an orientation to open innovation with the supplier, improves organizational performance in different areas: in the customer, in society, in people, and in the organization’s business results. Organizations must thus understand that one way to achieve entrepreneurial excellence is to strengthen their competence in managing the supply chain to which they belong.

7.3. Limitations and further research.

In spite of the results obtained, this study is not exempt from limitations. First, the perceptions of an organization are not uniform, as using a single informant can bias our research. This study would be enriched by using more than one informant per organization surveyed.

Second, as the measures, not only of dimensions of performance but also of the supply chain-open innovation relationship, have been newly developed for this study, further validation of their respective scales is an important step for future research.

Third, the results of the article are naturally limited to the empirical and geographical context in which
data was collected. Similar studies in other countries would provide useful and interesting comparative analyses. As Sisodiya et al (2013) argue, open innovation is a complex phenomenon that may be influenced by other factors that we have not taken into account in this study. Knowledge of this new paradigm would be enriched by using longitudinal instead of cross-sectional data.

We also propose as a future line of research analyzing the extent to which dynamic capacities affect the relationship between orientation to open innovation in the relationship maintained with the supplier and the buying firm’s competence in supply chain management.

Acknowledgement

This work has been developed with funding and collaboration of the Ministry of Science and Innovation and the European Union. Project I+D ECO2010-15885.
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Highlights:

To study how supply chain-open innovativeness relationship affects supply chain competence.
To observe the antecedents of open innovation in a supply chain context.
Measuring performance as a second-order construct.
An empirical analysis of manufacturing and services firms.